Claims:

What is claimed is:

1. A magnetic thin film, characterized in that:

it comprises a substrate, and $Co_2MGa_{1-x}Al_x$ thin film formed on said substrate,

said $Co_2MGa_{1-x}Al_x$ thin film has $L2_1$ or B2 single phase structure,

M of said thin film is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, and

an average valence electron concentration Z in said M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$.

2. The magnetic thin film as set forth in claim 1, characterized in that said substrate is heated, and said $Co_2MGa_{1-x}Al_x$ thin film is formed on said heated substrate.

3. The magnetic thin film as set forth in claim 1, characterized in that said $Co_2MGa_{1-x}Al_x$ thin film formed on the substrate is annealed.

4. The magnetic thin film as set forth in claim 1, characterized in that said substrate is either one of thermally oxidized Si, glass, MgO single crystal, GaAs single crystal, and Al_2O_3 single crystal.

5. The magnetic thin film as set forth in claim 1, characterized in that a buffer layer is provided between said substrate and said $Co_2MGa_{1-x}Al_x$ thin film.

6. The magnetic thin film as set forth in claim 5, characterized in that said buffer layer is made of at least either one of Al, Cu, Cr, Fe, Nb, Ni, Ta, and NiFe.

7. A tunnel magnetoresistance effect device, characterized in that:

in the tunnel magnetoresistance effect device having a plurality of ferromagnetic layers on the substrate, at least one of the ferromagnetic layers is $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, an average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film having either $L2_1$ or B2 single phase structure.

8. The tunnel magnetoresistance effect device as set forth in claim 7, characterized in that said ferromagnetic layer comprises a fixed layer and a free layer, and said free layer is $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film having either $L2_1$ or B2 single phase structure.

9. The tunnel magnetoresistance effect device as set forth in claim 7, characterized in that said substrate is heated, and said $Co_2MGa_{1-x}Al_x$ magnetic thin film is formed on said heated substrate.

10. The tunnel magnetoresistance effect device as set forth in claim 7, characterized in that said $Co_2MGa_{1-x}Al_x$ magnetic thin film formed on the substrate is annealed.

11. The tunnel magnetoresistance effect device as set forth in claim 7, characterized in that said substrate is either one of thermally oxidized Si, glass, MgO single crystal, GaAs single crystal, and Al_2O_3 single crystal.

12. The tunnel magnetoresistance effect device as set forth in claim 7, characterized in that a buffer layer is provided between said substrate and said $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$).

13. The tunnel magnetoresistance effect device as set forth in

claim 12, characterized in that said buffer layer is made of at least either one of Al, Cu, Cr, Fe, Nb, Ni, Ta, and NiFe.

14. A giant magnetoresistance effect device, characterized in that in the giant magnetoresistance effect device having a plurality of ferromagnetic layers on a substrate, at least one of the ferromagnetic layers is $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, an average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film having $L2_1$ or B2 single phase structure, and has the structure in which electric current flows in the direction perpendicular to film surface.

15. The giant magnetoresistance effect device as set forth in claim 14, characterized in that said ferromagnetic layer comprises a fixed layer and a free layer, and said free layer is $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film having either one of $L2_1$, B2, and A2 structures.

16. The giant magnetoresistance effect device as set forth in claim 14, characterized in that said substrate is heated, and said $Co_2MGa_{1-x}Al_x$ magnetic thin film is formed on said heated substrate.

17. The giant magnetoresistance effect device as set forth in claim 14, characterized in that said $Co_2MGa_{1-x}Al_x$ magnetic thin film formed on the substrate is annealed.

18. The giant magnetoresistance effect device as set forth in claim 14, characterized in that said substrate is either one of thermally oxidized Si, glass, MgO single crystal, GaAs single crystal, and Al_2O_3 single crystal.

19. The giant magnetoresistance effect device as set forth in claim 14, characterized in that a buffer layer is provided between said

substrate and said $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) thin film.

20. The giant magnetoresistance effect device as set forth in claim 19, characterized in that said buffer layer is made of at least either one of Al, Cu, Cr, Fe, Nb, Ni, Ta, and NiFe.

21. A magnetic device, characterized in that $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, an average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film having $L2_1$ or B2 single phase structure is formed on a substrate.

22. The magnetic device as set forth in claim 21, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in which a free layer is said $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film.

23. The magnetic device as set forth in claim 21, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device fabricated by heating said substrate, and from said $Co_2MGa_{1-x}Al_x$ magnetic thin film formed on said heated substrate.

24. The magnetic device as set forth in claim 21, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device fabricated by annealed said $Co_2MGa_{1-x}Al_x$ magnetic thin film formed on the substrate.

25. The magnetic device as set forth in claim 21, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in which said substrate is either one

of thermally oxidized Si, glass, MgO single crystal, GaAs single crystal, and Al_2O_3 single crystal.

26. The magnetic device as set forth in claim 21, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in which a buffer layer is provided between said substrate and said $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) thin film.

27. The magnetic device as set forth in claim 26, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in which said buffer layer is made of at least either one of Al, Cu, Cr, Fe, Nb, Ni, Ta, and NiFe.

28. A magnetic recording device, characterized in that it uses a magnetic head in which $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, an average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film having $L2_1$ or B2 single phase structure is formed on a substrate.

29. The magnetic recording device as set forth in claim 28, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in its magnetic head in which the free layer is said $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) magnetic thin film.

30. The magnetic recording device as set forth in claim 28, characterized in that it uses in its magnetic head a tunnel magnetoresistance effect device or a giant magnetoresistance effect device fabricated by heating said substrate, and from said $Co_2MGa_{1-x}Al_x$ magnetic thin film formed on said heated substrate.

31. The magnetic recording device as set forth in claim 28, characterized in that it uses in its magnetic head a tunnel magnetoresistance effect device or a giant magnetoresistance effect device fabricated by annealed said $Co_2MGa_{1-x}Al_x$ magnetic thin film formed on the substrate.

32. The magnetic recording device as set forth in claim 28, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in its magnetic head in which said substrate is either one of thermally oxidized Si, glass, MgO single crystal, GaAs single crystal, and Al_2O_3 single crystal.

33. The magnetic recording device as set forth in claim 28, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in its magnetic head in which a buffer layer is provided between said substrate and said $Co_2MGa_{1-x}Al_x$ (where M is either one or two or more of Ti, V, Mo, W, Cr, Mn, and Fe, the average valence electron concentration Z in M is $5.5 \leqq Z \leqq 7.5$, and $0 \leqq x \leqq 0.7$) thin film.

34. The magnetic recording device as set forth in claim 33, characterized in that it uses a tunnel magnetoresistance effect device or a giant magnetoresistance effect device in its magnetic head in which said buffer layer is made of at least either one of Al, Cu, Cr, Fe, Nb, Ni, Ta, and NiFe.